

Recent Research Overview

Post-Modification of the protein TDP-43 leads to neurodegenerative pathology

Expectations Targeted:

Under Overall Expectations

B1. Analyse technological applications of enzymes in some industrial processes, and **evaluate technological advances in the field of cellular biology**;

B3. **Demonstrate an understanding of the structures and functions of biological molecules**, and the biochemical reactions required to maintain normal cellular function.

Under Specific Expectations

Relating Science to Technology, Society, and the Environment

B1.2 Evaluate, on the basis of research, some advances in cellular biology and related technological applications (e.g., new treatments for cancer, HIV/AIDS, and hepatitis C; radioisotopic labelling to study the function of internal organs; **fluorescence** to study genetic material within cells; forensic **biological techniques** to aid in crime resolution) [IP, PR, AI, C]

Understanding Basic Concepts

B3.2 Describe the structure of important biochemical compounds, including carbohydrates, **proteins**, lipids, and nucleic acids, and **explain their function within cells**

Scientific Investigation Skills and Career Exploration

Throughout this course, students will:

A1. Demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, **analysing and interpreting, and communicating**);

A2. Identify and describe careers related to the fields of science under study, and describe contributions of scientists, including Canadians, to those fields.

Scientific Investigation

A1.3 Identify and locate a variety of print and electronic sources that enable them to address research topics fully and appropriately

A1.7 Select, organize, and record relevant information on research topics from a variety of

appropriate sources, including electronic, print, and/or human sources, using suitable formats and an accepted form of academic documentation

Analysing and Interpreting

A1.9 analyse the information gathered from research sources for logic, accuracy, reliability, adequacy, and bias

Communicating

A1.11 communicate ideas, plans, procedures, results, and conclusions orally, in writing, and/or in electronic presentations, using appropriate language and a variety of formats (e.g., data tables, laboratory reports, presentations, debates, simulations, models)

Teacher Instructions/Notes: Tools for protein Characterization and Discovery with respect to human disease – Recent Research Development

1. Use video as a hook, to peak students' interest, and start them on a path to inquiry.
2. Once video is played, maybe a couple of times, get the students to write down thoughts and tell them we will revisit this later.
3. Ask them to get into groups of 4, numbering each other one to 4 and to continue with the instructions on their hand-out and using their article that had been added to the wiki site.
4. After students have completed the cooperative learning activity, we come back as a group to discuss the results/findings of the activity.
5. The "hook" will then be revisited as the paper is up on **Smartboard** – and we go through it, highlighting areas/sections, purpose, results, etc. I will point out the link between the paper and the video in terms of proteins, fluorescence and microscopy techniques and will have **extra powerpoint material** (attached) to show how a 2D microscopic image can be rendered into a 3D image and what added information might be learned from that. I will show the video again.
6. The evaluation of the assignment will consist of each person writing a paragraph on what the purpose of the study was, what were the results and what conclusions were made. They must also include how they read the article (i.e. what order, if they skipped anything) to come up with their answers, as well as the application of what they have learned to reading/reviewing a second article of their choice. I will use **a rubric** (attached) for this to assess (only the comprehension part).
7. Taking in the ideas of the group I will consolidate the information to describe the way to read a paper, and actually the order (of the sections: intro, results, etc.) in which a paper actually is written (which is not necessarily the order in which it is published). This is an exercise on becoming familiar and comfortable with reading papers, and also to understand that new discoveries are always happening (latest research part). I will also emphasize the importance of proteins (everywhere and have many functions within the cell) – the functional translations of our DNA!
8. Finish off with an introduction to **Wordles** (www.wordle.net), their use especially in epigenetics (discussing **misconception** that gene expression cannot be changed (unless DNA mutated). I will show an example to class – "wordle of biochem unit", and describe this portion of assignment which will be a diagnostic (as and for learning) assessment of what the students learned.

Notes:

Wordles – take unit plan and paste into wordle – can present the unit in this way!? Can add weights – will change wordle – students will create a wordle with paper they will be examining – most important/essential parts, or on how they went about analyzing it? Another similar program that allows you to create wordles and other "visualizations": Many Eyes, IBM: <http://www.958.ibm.com/software/data/cognos/manyeyes/>